

Lesotho - Rural Water Supply and Sanitation

Report generated on: February 1, 2018

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Overview

Identification

COUNTRY

Lesotho

EVALUATION TITLE

Rural Water Supply and Sanitation

EVALUATION TYPE

Independent Impact Evaluation

ID NUMBER

DDI-MCC-LES-IE-RWSS-2010-2012

Overview

ABSTRACT

The Millennium Challenge Corporation (MCC), through its Compact with the government of Lesotho (GoL), awarded \$164-million over five years for investment in improved water supplies and sanitation facilities for rural and urban domestic, commercial, and industrial users. As part of its commitment to transparently and thoroughly monitor and evaluate its activities, the MCC contracted NORC in 2007 to conduct an impact evaluation of its water sector activities. This report presents the Impact Evaluation of the Rural Water Supply and Sanitation Activity (RWSSA).

RWSSA originally included 250 rural water supply points and 10,000 VIP latrines and had a budget of \$30.2 million (18 percent of the \$164-million Water Project in the Compact). In order to increase the coverage of VIP latrines in participating villages, MCC subsequently increased the budget to \$40.1 million and the Government of Lesotho (GoL) contributed \$17.1 million to RWSSA. In addition, the target for VIP latrines coverage was increased from 10,000 to 27,245 in the Lesotho M&E Plan. When the Lesotho Compact ended in September 2013, 175 water systems (70% of the target) and 29,352 VIP latrines (108% of the target) had been installed.

Implementation continued post-Compact with approximately \$5.3 million of additional funding from the GoL; ultimately, 250 water systems (100% of the target), and 31,768 VIP latrines (117% of the revised target), were completed. The total cost of RWSSA, including MCC and GoL funding during the Compact and after, was approximately \$60 million.

Households impacted by the program are located in villages that were identified by the Department of Rural Water Supply (DRWS) as lacking access to safe drinking water and adequate sanitation. To identify the effects of the program on the outcomes of interest, eligible villages were randomly assigned to treatment and control groups. The list of outcomes analyzed includes toilet use, type of water source used, time spent collecting water, diarrhea incidence and income, among others.

To evaluate the impact of the program we use data from the baseline and follow-up Impact Evaluation Multipurpose Surveys (IEMS). The IEMS is a longitudinal analytic survey specifically designed to collect data for the impact evaluations of the MCA-Lesotho Compact health and water (rural and urban) activities. The baseline version of the survey included items on basic sociodemographics, household access to water and sanitation, water consumption, hygiene and health profiles. The follow-up version of the survey added a few labor outcome items to the instrument.

During program implementation construction delays in some treatment villages meant that construction works ended after follow-up data collection. As a consequence, randomization was compromised because the villages that were actually treated before follow-up data collection were a subset of the villages that were assigned to the treatment group originally. To tackle this problem the evaluation used Instrumental Variables (IV) methods in order to evaluate the effect of the program. This approach exploits the fact that treatment assignment was randomized, but it also addresses the fact that treatment was not provided as planned in all treatment villages.

The impact evaluation shows that the program has had significant effects on key wellbeing indicators. It found that households in the treatment group are more likely than in the control group to use as their main water source an improved water source, such as a public standpipe or a protected spring, as opposed to an unimproved source, such as an unprotected spring or surface water. They are also more likely to use a toilet and spend less time collecting water. However, the evaluation did not find any impacts significant at standard levels of confidence for any of the diarrhea incidence indicators.

analyzed, although most of the estimated effects have the (negative) expected sign.

The evaluation also did not find any effects for any labor outcomes, or income. An important exception to this is that it found that the program has a positive and significant effect on female labor participation. The evaluation discusses the mechanisms that can explain why the effects on labor outcomes are not more apparent. In particular, it is possible that time availability does not translate into better labor outcomes because the latter are not restricted by time availability but by other conditions, like the labor market itself.

In terms of policy implications, the results described in this report imply that this type of program can have major impacts on households wellbeing via reductions on time spent collecting water, but limited effects on higher level outcomes, like diarrhea incidence. Furthermore, even if household members spend less time collecting water as a result of the program, it is not clear that this will translate into a 1:1 increase in the number of hours they participate in the labor market, as labor outcomes may depend on more factors than just greater available time.

EVALUATION METHODOLOGY

Randomization

UNITS OF ANALYSIS

Individual, household

KIND OF DATA

Sample survey data [ssd]

TOPICS

Topic	Vocabulary	URI
Water, Sanitation and Hygiene	MCC Sector	
Gender	MCC Sector	

KEYWORDS

Lesotho, Rural water, Impact evaluation, Water, Sanitation, Randomization, RCT, Diarrhea, Time savings

Coverage

GEOGRAPHIC COVERAGE

RWSSA was implemented in all 10 districts of Lesotho.

UNIVERSE

Households within the 72 villages for which baseline and follow-up data were collected.

Producers and Sponsors

PRIMARY INVESTIGATOR(S)

Name	Affiliation
NORC	Independent evaluator

OTHER PRODUCER(S)

Name	Affiliation	Role
MCA Lesotho		
Lesotho Bureau of Statistics		

FUNDING

Name	Abbreviation	Role
Millennium Challenge Corporation	MCC	

Metadata Production

METADATA PRODUCED BY

Name	Abbreviation	Affiliation	Role
Millennium Challenge Corporation	MCC		Review of Metadata

DATE OF METADATA PRODUCTION

2017-09-13

DDI DOCUMENT VERSION

Version 2 (September 2017). This version provides updates on the description of the analysis conducted and data collected.

DDI DOCUMENT ID

DDI-MCC-LES-IE-RWSS-2010-2012

MCC Compact and Program

COMPACT OR THRESHOLD

Lesotho

PROGRAM

Through its Compact with the Government of Lesotho the Millennium Challenge Corporation (MCC) awarded \$164-million over five years for investment in improved water supplies and sanitation facilities for rural and urban domestic, commercial, and industrial users. This evaluation focuses on MCC's rural water interventions, which comprise interventions designed to improve the rural water systems with the objective of providing safe drinking water close to households. It was anticipated that the intermediate outcomes of improved water sources would both decrease the burden of water-borne illness by creating a cleaner more sanitary water supply and also significantly reduce the amount of time it takes households to collect water. This, in turn, should help the MCC fulfill its mandate of reducing poverty through economic growth by allowing household members to be more productive and generate more income than they would have in the absence of improved access to cleaner water.

MCC SECTOR

Water, Sanitation and Hygiene (WASH)

PROGRAM LOGIC

The program logic for the Lesotho Rural Water Activity (see diagram in Annex A of the Evaluation Design Report) includes activities and outputs that are linked to three levels of outcomes: short-term, intermediate and long-term. These effects are:

Short-term outcomes · Increased hygiene awareness among communities · Increased access to improved sanitation · Increased access to improved water sources · Increased awareness/knowledge of Water Committees, Water Minders, and communities in maintaining systems

Intermediate outcomes · Improved hygiene behavior · Decreased water-related illness · Reduced expenditure on medical care · Time saved in water collection · Maintenance of systems by Water Minders

Long-term outcomes · Increased productive activity (productivity) · Increased income

PROGRAM PARTICIPANTS

The Lesotho Rural Water Activity constructed 250 new water systems in rural communities and provided ventilated improved pit (VIP) latrines for 31,768 households in those communities.

Sampling

Study Population

Households within the 72 villages for which baseline and follow-up data were collected.

Sampling Procedure

The sampling frame for the IEMS consists of all villages in Lesotho based on publicly available geospatial data and 2006 Census data. Information on administrative location, geo-coordinates, rural-versus urban designation and population was merged with publicly available physiographic and geographic data to be used as covariates in the sampling. From this central dataset, individual sample frames were designed and PSUs were selected for two central project components: rural water and urban/peri-urban water. For rural water, villages were the primary sampling units.

The centralized frame dataset consists of the following variables:

- Primary Sampling Unit identifying information: Village name, Village ID (both GIS ID and Census ID), Village Geo-coordinates (X and Y), Enumeration Area ID, Community Council, District, Constituency
- General covariates: Population, average annual temperature, precipitation, vegetation productivity potential, number of households, urban/rural designation

Sampling Design

The random sample selection was sequentially sampled without replacement in the form of a multistage cluster design as follows:

There are two stages to the design for the rural water intervention. They cover the designation and selection of villages (PSUs, clusters) and households (SSUs):

- Village sample. As described in the Evaluation Design Report, of the 250 villages in 10 districts selected by DRWS for the rural water interventions, 100 villages (10 per district) were deemed "ready" for the intervention in 2008. Fifty of these 100 villages were randomly assigned to treatment (Phase-A), while the remaining 50 were assigned to the control group (Phase-C). Final implementation lists, however, only consisted of a random sample of 50 treatment villages, 48 control villages. The village locations are shown on the map in Annex B in the Evaluation Design Report. The only difference between the treatment and control villages was that the control villages would receive treatment after a delay during the evaluation period according to the pipeline design.
- Household sample. Within each treatment and control village a systematic random sample of 13 households was selected. The interview was conducted with the head of the household or the person in the household most knowledgeable about household water and sanitation issues.

Deviations from Sample Design

At the follow-up, for unexplained reasons, in 75 villages the Lesotho Bureau of Statistics (BoS) deviated from the panel survey design and interviewed new households instead of returning to the same households as for baseline. As a result, BoS had to return to the field in April 2013 to interview the missing baseline households.

Response Rate

The response rate for the baseline was 952 complete interviews out of an intended 1,274, or 75%. For the midline, 673 panel cases were completed of the 952 original baseline interviews, a rate of 71%. There were another 431 follow-up cases that were not panel cases from baseline, and were not part of the analysis, but are included in the dataset.

Weighting

No weighting was applied.

Questionnaires

Overview

The main data source for this evaluation was the Impact Evaluation Multipurpose Survey (IEMS). The IEMS is a longitudinal analytic survey specifically designed to collect data for the impact evaluations of the MCA-Lesotho Compact health and water (rural and urban) activities. The baseline version of the survey included items on basic sociodemographics, household access to water and sanitation, water consumption, hygiene and health profiles. The follow-up version of the survey included essentially the same items and added a few labor outcome questions to the instrument.

Data Collection

Data Collection Dates

Start	End	Cycle
2012-11	2012-12	Follow-up
2013-04	2013-04	Follow-up Update

Data Collection Mode

Data was collected on the paper-and-pencil IEMS questionnaire, which was entered into SPSS datasets by BOS staff. The IEMS is a longitudinal analytic survey specifically designed to collect data for the impact evaluations of the MCA-Lesotho Compact health and water (rural and urban) activities. The baseline version of the survey included items on basic sociodemographics, household access to water and sanitation, water consumption, hygiene and health profiles. The follow-up version of the survey added a few labor outcome items to the instrument. Both the baseline and follow-up datasets underwent extensive data consistency checks and cleaning procedures prior to merging. These largely consisted of checking if logical skips in the questionnaire were correctly followed, and making adjustments to the data accordingly. Out-of-range responses were corrected or changed to missing values. Also before merging, the generated indicators used for analysis were calculated separately in each dataset. In most cases, the survey questions underlying each indicator were the same in both rounds, but in some cases, differences in the instruments required different formulae. Originally, cases were to be matched using a unique household ID, comprising the BoS enumeration area (EA) code, and a two-digit suffix representing the order of the household within the EA. However, for most of the IEMS sample, the primary sampling unit was the village, rather than EA, making this an inadequate method of matching panel cases; duplicates are rife (that is, two households had the same ID number), and the precise boundaries of EAs are not always well known in rural areas. Therefore, a unique case identifier had to be constructed from the existing ID variables in order to match panel cases. This identifier was generated by creating, and then concatenating, two non-unique identifiers: the village ID and the household number. Because no village ID appears in the raw data (only the village name), villages were assigned persistent, unique three-digit codes for matching purposes. The household number is the two-digit household order suffix from the original household ID. This number is not unique in itself (it starts over from 01 for each primary sample unit), but when combined with the village ID, the resulting identifier is almost unique (in the sense that this combined variable uniquely identifies most observations) and persistent between rounds. Some duplicates resulted in the baseline dataset in a few cases when two EAs existed in the same village, causing the household number to repeat; these were manually matched to midline households and assigned new IDs. Once all of the remaining duplicate IDs were corrected, all midline variables were assigned a "mid_" prefix and the two datasets were merged.

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Data Collectors

Name	Abbreviation	Affiliation
Bureau of Labor Statistics		Government of Lesotho

Data Processing

Data Editing

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Other Processing

Data was collected on the paper-and-pencil IEMS questionnaire, which was entered into SPSS datasets by Bureau of Statistics staff.

Data Appraisal

Estimates of Sampling Error

As it is explained in the report, this study was not intended to produce results that were representative of a large population (like rural areas in Lesotho), because villages were selected for the study purposefully (as opposed to randomly), so the results are 'representative' only of the households in the selected villages. However, the panel sample (and the results derived from it) may not be representative even of the households in the selected villages due to sample deterioration. To address this possibility, in Annex E the evaluation conducted two exercises. First, it used Inverse Probability Weights to correct for sample attrition, and shows that the results are not sensitive to this correction. Second, it followed Karlan and Valdivia (2011) and constructed different sets of bounds for the treatment impacts in order to assess the extent to which sample attrition may be biasing the results; it found that for most of the outcomes the estimated bounds do not change the conclusions derived from the main specifications.